भारतीय मानक

Indian Standard

IS 6923 : 2023

चूड़ीदार बोर्ड कंक्रीट की कार्यकारिता — परीक्षण पद्धति

(पहला पुनरीक्षण)

Performance of Screed Board Concrete Vibrators — Method of Test

(First Revision)

ICS 91.220

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

June 2023 **Price Group 4**

Construction Plant and Machinery Sectional Committee, MED 18

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Construction Plant and Machinery Sectional Committee had been approved by the Mechanical Engineering Division Council.

In this standard an attempt has been made to arrive at a method of test for direct measurement of compacting characteristics of screed board concrete vibrators to assess their performance in terms of compaction of concrete. The vibration characteristics for screed board concrete vibrators are indicated in IS 2506 : 2022 which also recommends the methods for measuring these characteristics.

This standard was first published in 1973. This standard is being revised again to keep pace with the latest technological developments and international practices. In this revision, the standard has been brought into the latest style and format of Indian Standards, and references of Indian Standards, wherever applicable have been updated. BIS certification marking clause has been modified to align with the revised *Bureau of Indian Standards Act*, 2016. The following major modifications have been incorporated with revision of the standard.

a) Clause **3** on provisions for principle of test has been modified; and
b) Clause **5** on method of test has been updated as per the current best practices.

The composition of the committee responsible for the formulation of this standard is listed in Annex A.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'.

Indian Standard

PERFORMANCE OF SCREED BOARD CONCRETE VIBRATORS — METHOD OF TEST

(First Revision)

1 SCOPE

This Indian Standard covers the method of test for performance of screed board concrete vibrators in terms of compaction of concrete.

2 REFERENCES

The standards listed below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below:

IS No.	*Title*
IS 269 : 2015	Ordinary Portland Cement — Specification (*sixth revision*)
IS 383 : 2016	Coarse and fine aggregate for concrete — Specification (*third revision*)
IS 456 : 2000	Plain and reinforced concrete — Code of practice (*fourth revision*)
IS 2506 : 2022	General requirements for concrete vibrators, screed board type (*second revision*)

3 PRINCIPLE OF TEST

3.1 The vibrator, when tested in accordance with the procedure laid down in **5** for compaction of concrete, shall be capable of compacting fully in one pass of the screed board, a 180 mm thick cement concrete slab of M15 grade and having a workability of compacting factor 0.78 ± 0.01 laid over 75 mm thick stable base of fully hardened mix M30 grade.

3.2 The degree of compaction of slab shall be observed by measurement of density from top to bottom of nine 100 mm diameter cores cut from the compacted slab cured and hardened for 14 days. The slab shall be fully compacted, if the density of concrete anywhere on the depth of each of the core is not less than 95 percent of the maximum wet density of the mix as calculated theoretically (*see* **5.4**) or determined experimentally (*see* **5.4.1**).

4 MATERIALS

4.1 Cement shall conform to IS 269.

4.2 Aggregates shall conform to IS 383.

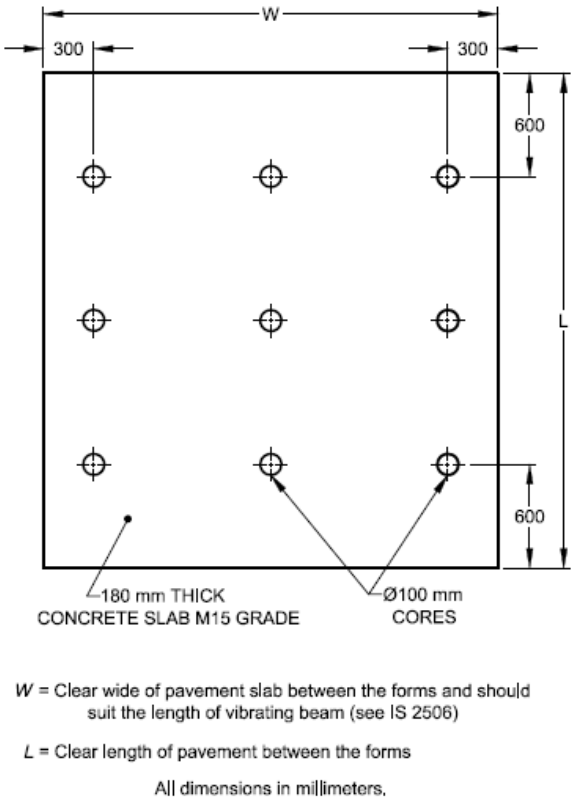
4.3 Concrete shall be prepared in accordance with the requirements of IS 456.

5 METHOD OF TEST

5.1 The base of M10 to M15 grade concrete suitable for the location, shall be laid and compacted to the required thickness to suit the overall dimensions of the test slab as indicated in Fig. 1. The base slab shall be cured for at least seven days and the test slab shall be laid on it after another seven days.

5.2 The forms shall be laid on the lean concrete base to the required thickness of the compacted test slab and to suit the dimensions given in Fig. 1. The concrete shall be laid evenly in the forms so that the surcharge above the top of the forms is between 25 mm to 30 mm (*see* below given Note). The vibrator shall be started and the vibrating beam shall be moved forward over the concrete surface at an approximate speed of 300 mm/min in steps equal to three fourth of the width of the vibrating beam and lifted on to the un-compacted concrete at each step along the length of slab. The slab shall be compacted by one pass of the vibrating beam as indicated. Compaction slab shall be suitably cured for seven days and the cores shall be cut for density determination after allowing the slab to mature for another seven days.

NOTE — It is essential to judge to correct surcharge at the start of the test, because for a concrete of given workability, the amount of compaction is related to the change in the level of the surface of concrete during the passage of the vibrator. Too small a surcharge (that is too small a height of the concrete above the level of the tops of the forms before compaction) will result in poor compaction at the bottom of the slab, even though the surface is sealed and the compaction at the top appears good. Too great a surcharge will cause concrete to pile up in front of the beam until it reduces the speed of the machine and ultimately stops its forward motion. Correct surcharge may be judged before the start of the experiment, by adding material until no more can be compacted into the finished thickness of the slab.



W = Clear wide of pavement slab between the forms and should suit the length of vibrating beam (see IS 2506)

L = Clear length of pavement between the forms

All dimensions in millimeters.

FIG. 1 DIAGRAM ILLUSTRATING THE POSITION OF CORES TO BE CUT FROM CONCRETE SLAB

5.3 Nine cores of 100 mm diameter shall be drilled from the full depth of the hardened concrete as indicated in Fig. 1 and each core shall be sliced into sections about 45 mm thick. These sections shall be dried to constant weight to remove internal moisture, cooled in a desiccator and weighed. To determine the volume each section shall then be placed in molten paraffin wax and allowed to cool until the wax is in plastic condition. The excess wax shall be scraped off, leaving the surface voids filled and the concrete waterproofed. The wax covered section shall then be weighed in air and in water. From the weight and volume, the average dry density shall be determined for each slice.

5.4 Knowing the mix proportions of concrete and the specific gravities of different constituents, the theoretical maximum wet density of the freshly mixed concrete shall be determined from the following equation:

$$dc = \frac{(w + c + s + a)\,1\,000}{\left(w + \frac{c}{S_o} + \frac{s}{S_s} + \frac{a}{S_a}\right)\frac{100}{100 - p}}$$

.

where

dc	=	theoretical maximum wet density of concrete in kg/ m^3;
w	=	quantity of water in l;
c	=	weight of cement in kg;
s	=	weight of sand in kg;
a	=	weight of coarse aggregate in kg;
S_o	=	specific gravity of cement;
S_s	=	specific gravity of sand;
S_a	=	specific gravity of coarse aggregate; and
p	=	permissible percentage of voids in concrete to be taken as 2 for the purpose of this test.

5.4.1 Alternatively maximum wet density may be obtained by filling cube or cylinder moulds with the concrete in shallow layers and applying table vibration for at least one minute to ensure the expulsion of all air. The weight of the compacted concrete divided by the volume will give the maximum wet density.

ANNEX A
(*Foreword*)

COMMITTEE COMPOSITION

Construction Plant and Machinery Sectional Committee, MED 18

Organization	*Representative(s)*
Directorate General of Quality Assurance, Ministry of Defence, New Delhi	BRIG RAJNEESH BHATNAGAR **(*Chairperson*)**
AIMIL Limited, New Delhi	SHRI ROHITASH BARUA SHRI K. K. VYASAS (*Alternate*)
Ajax Engineering Private Limited, Bengaluru	SYED MOHAMMED RIAZ NAWAZ SHRI JORLIN P. V. (*Alternate* I) SHRI MANJUNATH D. JAGGAL (*Alternate* II) SHRI KRISHNA KISHORE (*Alternate* III)
Ammann Apollo India Private Limited, Jagudan, Gujarat	SHRI GIRISH DIXIT SHRI ASHISH PATEL (*Alternate* I) SHRI MANAN RAJPURA (*Alternate* II) SHRI PRASAD DAYAL (*Alternate* III) SHRI GEETESH MAKADIA (*Alternate* IV) SHRI ARPAN PATEL (*Alternate* V) SHRI KARTIK TRIVEDI (*Alternate* VI)
Atlas Copco India Limited, Pune	SHRI VIJAY SHARMA SHRI YOGESH TULJAPURKAR (*Alternate*)
B. G. Shirke Construction Technology Limited, Pune	SHRI A. D. BHOSALE SHRI SUNIL KEDAR (*Alternate*)
Builders Association of India, Mumbai	SHRI V. G. SAKTHIKUMAR
Caterpillar India Private Limited, Chennai	SHRI K. REJI JOSE SHRI RAMESH VISHWANATHAN (*Alternate*)
Central Water Commission, New Delhi	SHRI DILIP KUMAR JHA SHRI KRISHNAJI SINGH (*Alternate*)
CSIR - Central Building Research Institute, Roorkee	DR SUVIR SINGH DR BANTI A. GEDAM (*Alternate*)
Directorate General Border Roads, New Delhi	COL AMIT BHARDWAJ
Directorate General of Quality Assurance, Ministry of Defense, New Delhi	COL RAVI LOGANATHAN LT COL S. TALEWAR (*Alternate*)
Epiroc Mining India Limited, Nashik	SHRI VENKATESAN BASHYAM SHRI MUTTANNA JAPANNAVAR (*Alternate*)
Escorts Construction Equipment Limited, Faridabad	SHRI FAIZ AHMAD SHRI ASHOK CHAUHAN (*Alternate* I) SHRI LAXMI CHAND TYAGI (*Alternate* II)
Indian Construction Equipment Manufacturers Association, New Delhi	SHRI K. V. KRISHNAMURTHY
IRCON International Limited, New Delhi	SHRI RANDHIR GUPTA SHRI S. K. RAY (*Alternate*)
Jaypee India Limited, Kolkata	SHRI KUMAR M. MEHTA SHRI RAHUL KUMAR TEOTIA (*Alternate*)

Organization	*Representative(s)*
John Deere India Private Limited, Mumbai	SHRI KARTHIK KALIAPPAN SHRI RAJ ANAND (*Alternate*)
Larsen and Toubro Construction Limited, Karnataka	SHRI GURUPRASAD S. R. SHRI DHANAJI HARIBA MANGUDE (*Alternate*)
Larsen and Toubro Limited, Mumbai	SHRI K. KESHAVA SHRI M. SURESH KUMAR (*Alternate*)
Ministry of Road Transport and Highways, New Delhi	SHRI K. C. SHARMA SHRI JITENDRA KUMAR (*Alternate*)
National Council for Cement and Building Materials, Faridabad	SHRI KAPIL KUKREJA SHRI SAURABH BHATNAGAR (*Alternate*)
Schwing Stetter (India) Private Limited, New Delhi	SHRI RAJEEV SHALIA SHRI VARADHARAJAN R. (*Alternate*)
Volvo Construction Equipments India Private Limited, Bengaluru	SHRI V. R. SAI PRASAD POLIPALLI SHRI K. RAGHURAMAN (*Alternate*)
Wirtgen India Private Limited, Pune	SHRI DEEPAK BHOIR SHRI PARUL ARORA (*Alternate*)
In Personal Capacity (*Flat no. 3052, Prestige Shantiniketan, Whitefield Main Road, Bengaluru*)	SHRI S. N. MAHAJAN
In Personal Capacity (*D-24, Amar Colony, New Delhi*)	SHRI SATENDER KUMAR
BIS Directorate General	SHRI RAJNEESH KHOSLA, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (MECHANICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI LOKRAJ MEENA
SCIENTIST 'B'/ASSISTANT DIRECTOR
(MECHANICAL ENGINEERING), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: MED 18 (20664).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.

Published by BIS, New Delhi